SERVICE MANUAL

DATSUN PICK-UP
MODEL 620 SERIES
CHASSIS & BODY

NISSAN

NISSAN MOTOR CO., LTD.
TOKYO, JAPAN

SECTION ST

STEERING SYSTEM

ST

STEERING

CONTENTS

DESCRIPTION

The steering gear used on this model series vehicles is the same recirculating type as that used on model 521 series. This steering gear is designed especially for easy operation and high durability.

The steering linkage is of a relay design, of which gear arm is connected to one end of the adjustable cross rod. The other end of the cross rod is linked to the idler arm connecting with the side member located on the opposite side of the steering gear. The two side rods serve to connect the steering gear arm and idler arm to the both knuckle arms (right and left hand side).

With this construction, even if the left and/or right wheel moves vertically and independently, steering can be safely maintained.

Steering wheel rotation is converted to gear arm motion in proportion to the gear ratio by the steering gear. The gear arm motion operates the side rod on the same side. At the same time, the idler arm is moved through the cross rod, and the opposite side rod is also moved.

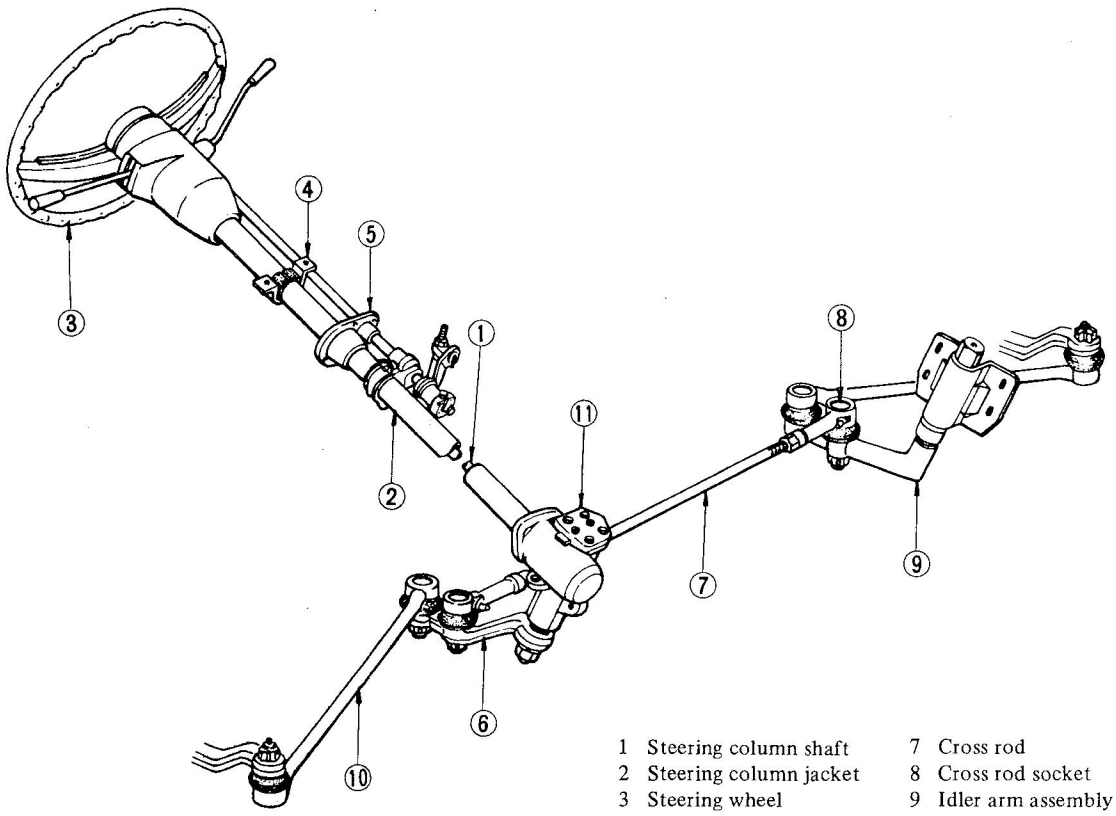
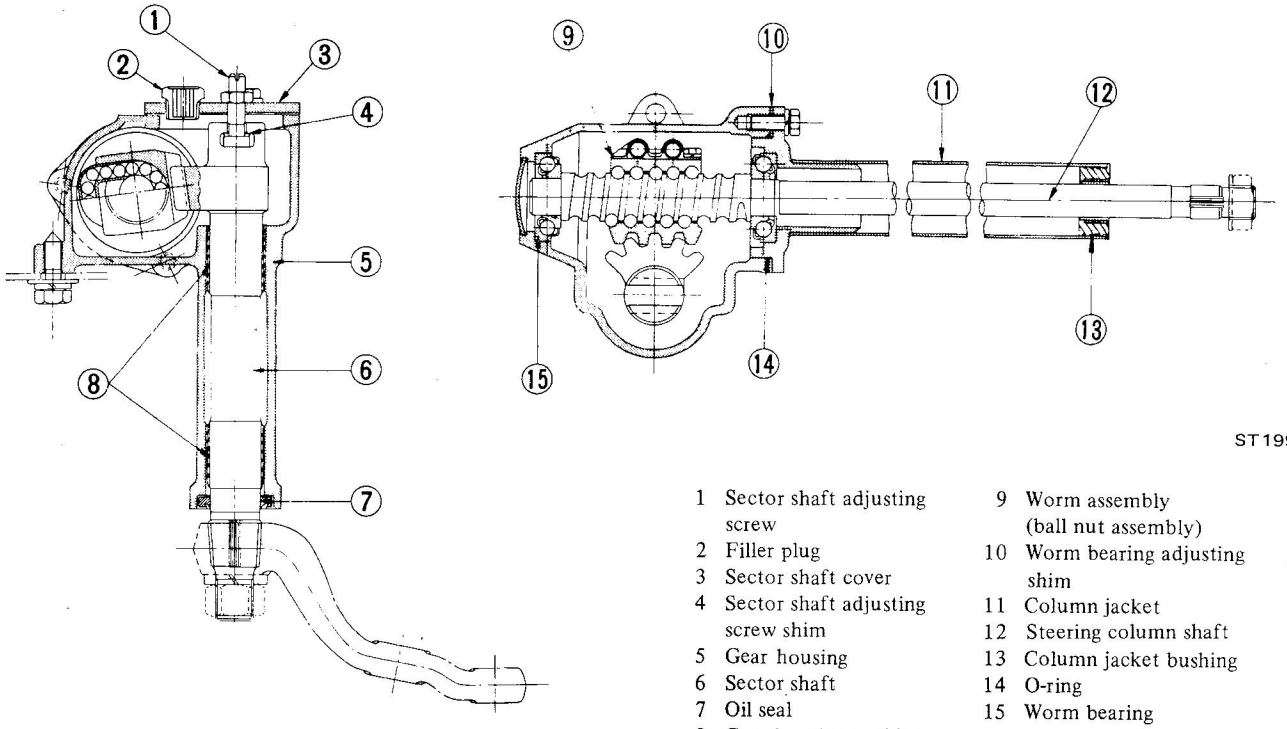


Fig. ST-1 Structural view of steering system

STEERING GEAR



1 Sector shaft adjusting screw
2 Filler plug
3 Sector shaft cover
4 Sector shaft adjusting screw shim
5 Gear housing
6 Sector shaft
7 Oil seal
8 Gear housing bushing
9 Worm assembly (ball nut assembly)
10 Worm bearing adjusting shim
11 Column jacket
12 Steering column shaft
13 Column jacket bushing
14 O-ring
15 Worm bearing

Fig. ST-2 Sectional view of steering gear

Removal and installation

Removal

1. Disconnect battery ground cable from the terminal.
2. Remove horn pad by unscrewing two bolts from the rear side of steering wheel bar.

Note: Be sure to punch mark with "o" on the top of steering column shaft.

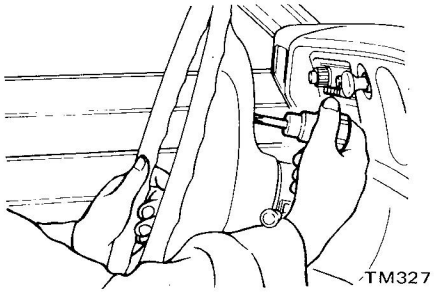


Fig. ST-3 Removing horn pad

3. Remove steering wheel with Steering Wheel Puller ST27180000 after backing off steering wheel fixing nut.

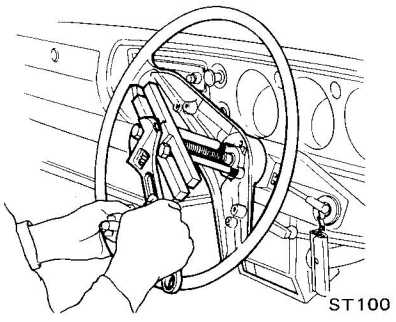


Fig. ST-4 Removing steering wheel

Note: Be sure not to hammer the special tool while removing.

4. Remove upper and lower steering column shell covers.
5. Remove turn signal switch assembly.
6. Draw out hand lever by removing snap ring and pivot pin if equipped.
7. Remove column clamp unscrewing two fixing bolts.

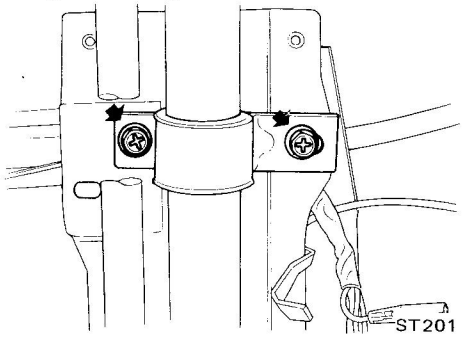


Fig. ST-5 Removing column clamp

8. Remove four bolts securing steering post grommet to dash panel.
9. Disconnect shift lever from upper shift rod and select lever from select rod at trunnions if equipped.
10. Remove nut securing gear arm to sector shaft and then withdraw gear arm with the use of Steering Gear Arm Puller ST27140000.

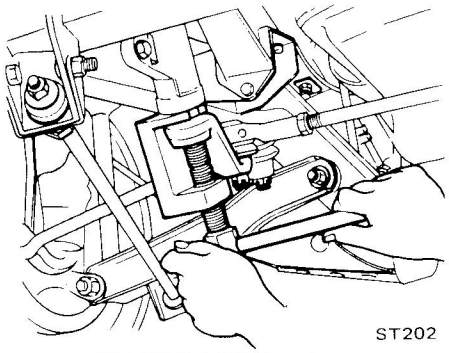


Fig. ST-6 Withdrawing gear arm

Note: Before removing steering gear arm, scribe match marks on arm and housing so that they can easily be replaced in their original positions at assembly.

11. Remove three bolts securing steering gear housing to frame.
12. Withdraw steering gear assembly toward engine compartment.
13. Detach transmission control parts from steering column jacket if equipped.

Installation

Install steering gear assembly in the reverse order of removal observing the following instructions.

1. When installing steering gear housing securing bolts, insert two bolts through gear housing to frame.

2. Tightening torque
   Steering gear housing:
   4.6 to 5.3 kg-m (33 to 38 ft-lb)
   Gear arm: 14 kg-m (101 ft-lb)
   Steering wheel:
   7 to 7.5 kg-m (51 to 54 ft-lb)

3. With front wheels set in a straight ahead position, make sure that punch mark on the upper end surface of steering column shaft is at the center of the upper side in its installing portion.
4. When installing steering wheel, apply grease to sliding parts.
5. After installing, make sure that steering wheel turns smoothly.

Disassembly and assembly

Disassembly

1. Drain oil in steering gear housing by unscrewing filler plug.
2. Place steering gear assembly in a vise securely.
3. Loosen lock nut and turn sector shaft adjusting screw a few turns counterclockwise.

   Remove sector shaft cover by unscrewing four fixing bolts.

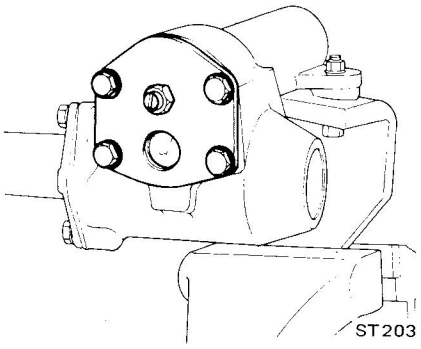


Fig. ST-7 Removing sector shaft cover

4. Turn sector shaft adjusting screw a few turns clockwise and pull sector shaft cover together with sector shaft from gear housing.

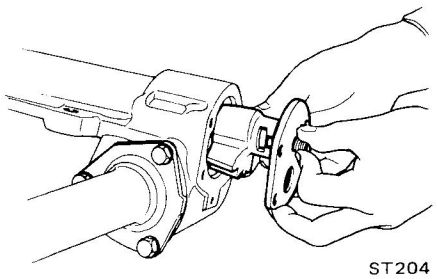


Fig. ST-8 Pulling out sector shaft

5. Separate sector shaft, adjusting screw and shim from cover.
6. Remove jacket tube by unscrewing three fixing bolts.
7. Remove steering worm assembly from gear housing.
8. Detach worm bearings and worm bearing adjusting shims from worm gear assembly and column jacket.

Note: Be careful not to allow ball nut to run down to the worm end. If ball nut rotates suddenly to the worm end, the ends of ball guides may be damaged.

9. Pry out sector shaft oil seal from gear housing and discard it.
10. Remove O-ring from the rear cover of column jacket and discard it.
11. Remove column jacket bushing.

Notes:

a. Do not remove sector shaft bushing from housing. If necessary, replace as a gear housing assembly.

b. Do not disassemble ball nut and worm gear. If necessary, replace them with new ones as a worm gear assembly.

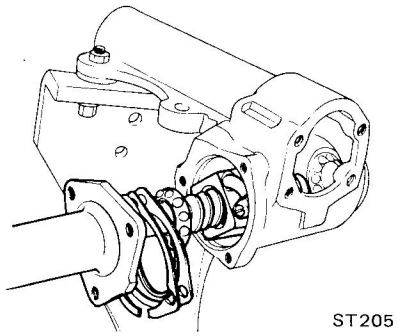


Fig. ST-9 Removing steering worm assembly

Assembly and adjustment

Apply recommended gear oil to all disassembled parts.

1. Fit column jacket bushing to column jacket in place.

Note: When fitting, apply adhesive to bushing exterior and grease to interior.

2. Fill the space between new sector shaft oil seal lips with grease, and fit it to gear housing.
3. Place steering worm assembly in position in gear housing together with worm bearings.
4. Install column jacket on gear housing with O-ring and worm bearing shims.

   Be sure to install thicker shims to the gear housing side.

   Standard shim thickness:
   1.5 mm (0.0591 in)
   Tightening torque:
   1.6 to 1.8 kg-m (12 to 13 ft-lb)

Available worm bearing adjusting shim

No.	Thickness mm (in)
1	0.762 (0.0300)
2	0.254 (0.0100)
3	0.127 (0.0050)
4	0.050 (0.0020)

5. Adjust the worm bearing preload by selecting suitable bearing shims so that the initial turning torque of steering column is the specified value.

Initial turning torque of steering column shaft.

New worm bearing:
4.0 to 6.0 kg-m (29 to 43 ft-lb)

Used worm bearing:
2.4 to 4.4 kg-m (17 to 32 ft-lb)

At the circumferences of steering wheel:

New: 0.2 to 0.3 kg
(0.4 to 0.7 lb)
Used: 0.12 to 0.22 kg
(0.3 to 0.5 lb)

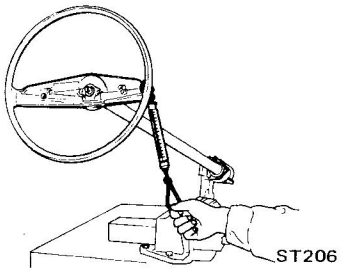


Fig. ST-10 Measuring initial turning torque

6. Insert adjusting screw into the T-shaped groove at the sector shaft head, and adjust the end play between sector shaft and adjusting screw until it is within 0.01 to 0.03 mm (0.0004 to 0.0012 in) by choosing suitable adjusting shims.

Available sector shaft adjusting screw shim

No.	Thickness mm (in)
1	1.575 (0.0620)
2	1.550 (0.0610)
3	1.525 (0.0600)
4	1.500 (0.0591)
5	1.475 (0.0580)
6	1.450 (0.0571)

7. Rotate ball nut by hand until it is in the center of its travel, then install sector shaft together with adjusting screw in gear housing, ensuring that the center gear of sector shaft engages with that of ball nut.
8. Install sector shaft cover to gear housing. Be sure to apply sealant to each face of sector shaft cover packing when installing cover.
9. By turning adjusting screw counterclockwise, attach sector shaft cover to gear houisng and then temporarily secure it with its fixing bolts.
10. Pull sector shaft toward cover approximately 2 to 3 mm (0.08 to 0.12 in) by turning adjusting screw counterclockwise and tighten sector shaft cover fixing bolts to 1.6 to 1.8 kg-m (12 to 13 ft-lb).
11. Push sector shaft against ball nut gear by gradually turning adjusting screw clockwise until sector shaft gear lightly meshes with ball nut gear and then temporarily secure adjusting screw with lock nut.
12. Install gear arm to sector shaft and move sector shaft several times from the side of gear arm and make sure that it turns smoothly.
13. Adjust the backlash at the neutral position of gear arm by turning in or out adjusting screw so that the movement of the gear arm top end is less than 0.1 mm (0.004 in).

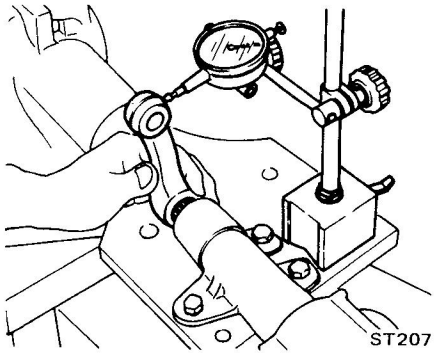


Fig. ST-11 Measuring backlash

14. Turn adjusting screw approximately 1/8 to 1/6 turn clockwise and then retighten lock nut to 3.2 to 3.7 kg-m (23 to 27 ft-lb).
15. Fill recommended gear oil approximately 0.33 liter (3/8 U.S.qt., ¼ Imper. qt.) into gear assembly through the filler hole and install filler plug.

Inspection and repair

Wash clean all the disassembled parts in solvent and check for conditions.

Sector shaft

1. Check gear tooth surface for pitting, burrs, cracks or any other damage, and replace if defective.
2. Check sector shaft for distortion of its serration, and if necessary replace. In this case, be sure to check gear housing for deformation.

Steering column shaft assembly

1. Inspect the ball nut gear tooth surface, and replace if pitting, burrs, wear or any other damage is found.
2. Ball nut must rotate smoothly on worm gear. If found too tight, assembly should be replaced. Check as follows:

Move ball nut to either end of worm gear, and gradually stand steering column shaft assembly until ball nut moves downward on worm gear under its own weight. In the above test, if ball nut does not move freely over entire stroke, assembly may be damaged. Replace with a new one as an assembly.

Note: In this inspection, be careful not to damage ball nut guide tube.

Bearings and bushings

1. Replace worm bearings if pitting, wear or any other damage is found on them.
2. Replace column bushing and gear housing bushings which are excessive worn or deformed.

Oil seal, gasket and O-ring

Do not reuse above parts which are removed once.

Be sure to use new parts at each reassembly.

STEERING LINKAGE

Removal and installation

Removal

1. Jack up the front of vehicle and support it on the safety stands.
2. Remove cotter pins and nuts fastening side rod ball stud to knuckle arms.
3. To detach side rod ball studs from knuckle arms, insert steering Ball Joint Puller ST27850000 between them and separate them by striking the top of this tool with a hammer. If this operation must be done without this tool, strike the knuckle arm boss with a hammer backing up the opposite side of it with a large hammer and ball stud is freed from knuckle arm. Must not strike the ball stud head, the ball socket of side rod and side rod with a hammer and so on in this operation.

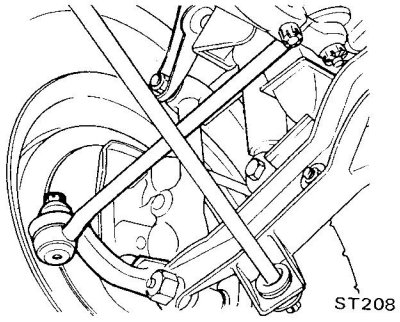


Fig. ST-12 Ball joints (gear arm side)

4. Remove nut securing gear arm on sector shaft, and remove gear arm with the use of Gear Arm Puller ST27140000. See Figure ST-6.
5. Remove idler arm assembly from frame by backing off fixing bolt and nut.

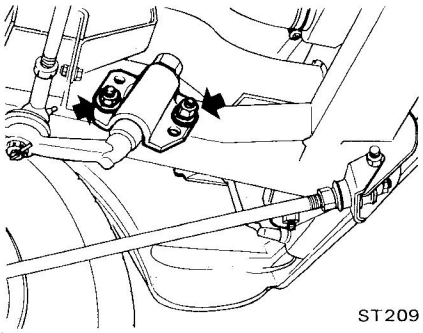


Fig. ST-13 Removing idler arm

6. Cross rod, both side rods and the adjacent parts can then be freed from the vehicle as an assembly.
7. Then separate the ball joints of steering linkage assembly following the procedure for removal of the side rods ball joints at knuckle arm sides.

Assembly

Install steering linkage in the reverse sequence of removal observing the following notes:

1. Tightening torque:

Ball stud: 5.5 to 7.6 kg-m (40 to 55 ft-lb)
Idler arm assembly: 3.2 to 3.7 kg-m (23 to 27 ft-lb)
Cross rod adjust bar lock nut: 8 to 10 kg-m (58 to 72 ft-lb)

2. When cross rod sockets and cross rod are separated, adjust cross rod length correctly.

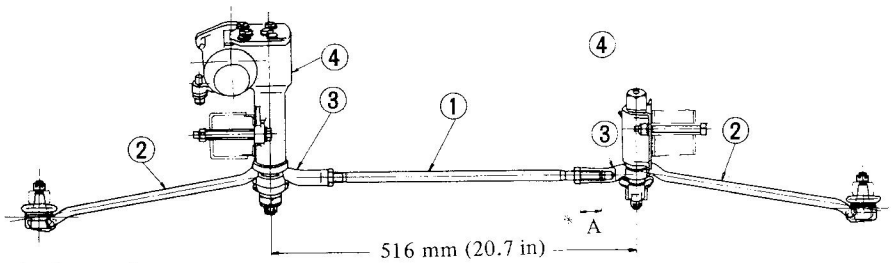
Adjustment should be done between the centers of ball joints at the both end of cross rod assembly.

Standard cross rod length: 516 mm (20.31 in)

3. Adjust toe-in and steering angle.

The procedures of toe-in and steering angle adjustments are described in SECTION "FRONT AXLE AND SUSPENSION."

Toe-in: 2 to 3 mm (0.079 to 0.118 in)
Steering angle:
Inner wheel: 35°30′ to 36°30′
Outer wheel: 30°30′ to 31°30′

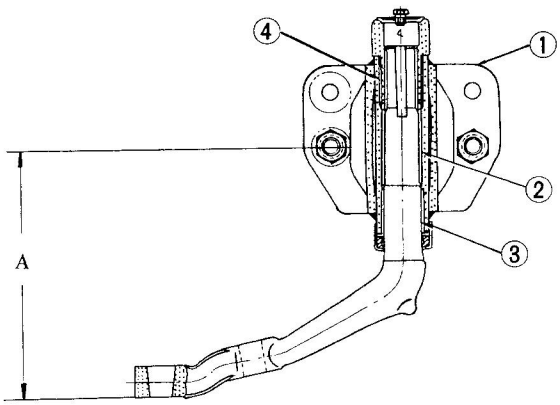


1 Cross rod
2 Side rod
3 Cross rod socket
4 Idler arm assembly
5 Gear housing assembly

* After adjustment of toe-in, be sure that dimension "A" at the both ends of cross rod is not less than 20 mm (0.787 in)

Fig. ST-14 Adjusting cross rod assembly

Idler arm assembly



1 Idler body
2 Collar (welded to idler body)
3 Plain bushing
4 Screw bushing

Fig. ST-15 Sectional view of idler arm assembly

1. Apply recommended grease to screw bushing interior, plain bushing interior, dust seal inside and bushing sliding surface of idler arm.

Screw bushing tightening torque:
12 kg-m (87 ft-lb)

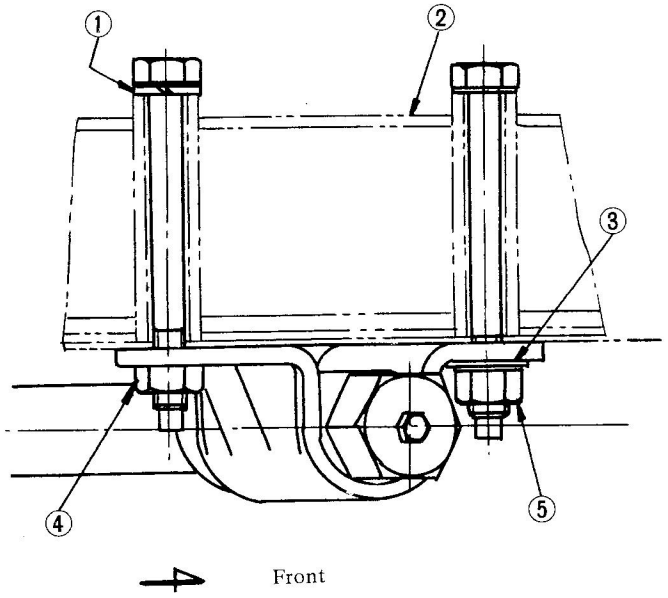
2. Before installing idler arm assembly, replace filler plug with grease nipple, and apply recommended grease to idler arm through this grease nipple until grease is forced out at the lower end of the dust seal lip. Remove grease nipple and reinstall filler plug.

3. In installing idler arm assembly, make sure that the standard dimension "A" is adjusted correctly.

Standard dimension "A":
137.8 to 139.8 mm
(5.43 to 5.50 in)

See Figure ST-15.

Furthermore, take care to install washers correctly as shown Figure ST-16.



1 Spring washer
2 Frame
3 Plain washer
4 Weld nut
5 Self locking nut

Fig. ST-16 Locations of washers

Inspection and repair

Ball joint

1. When ball stud is worn or axial play is too excessive, replace cross rod socket or side rod with a new one.
2. When dust cover is broken or deformed, be sure to replace with a new one.

Axial end play: 0.1 to 0.5 mm
(0.004 to 0.020 in)

Initial swing torque:
5 to 15 kg-m (70 to 209 in-oz)

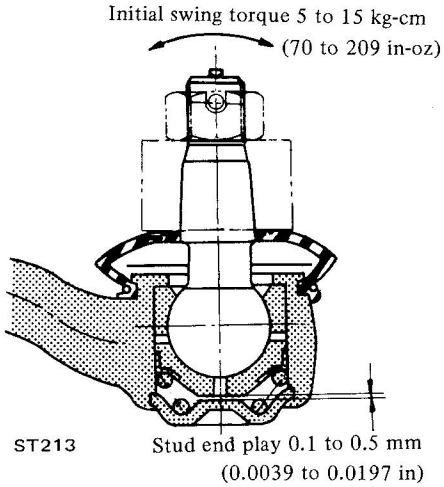


Fig. ST-17 Sectional view of ball joint

Note: At every 9,000 km (5,500 miles) running, check grease and renew if necessary. To renew grease, remove grease nipple cap and apply recommended grease to ball joint through grease nipple until grease is forced out at the grease vent hole.

Idler arm assembly

Remove old grease and dirt, and check idler arm assembly for wear, deformation and damage.

Cross rod, side rod and gear arm

Check them for bending, damage and crack, and replace as necessary.

Inspecting steering system on the vehicle which comes into collision

Steering system is very important for driving a car. When the car comes into collision, especially the front of the car is damaged, special inspection should be done for the following matters.

If any component parts of steering system is found to be defective, replace them with new ones.

1. Steering angles correctness

Inspect side rods and cross rod for bend, and sector shaft for distortion.

2. Level of steering wheel bar (with the front wheels in a straight ahead position)

If its deflection is more than about 90 degree, the bend or distortion of sector shaft and column shaft can be seen.

3. Noise during operation of steering wheel.

Inspect column shaft and jacket tube for bend.

4. Smooth operation of steering wheel

Inspect sector gear for breakage, ball nut screw for dint and column shaft for bend.

5. Gear arm breakage
6. Gear housing breakage

In addition, inspect gear housing fixing bolts for looseness.

7. Distortion of sector shaft serration
8. Sector gear breakage

9. Column shaft breakage (on the welded section)

In addition, inspect column shaft for scratch.

10. Deformation of body construction and frame

Inspect the installation portion of steering system on the body construction and frame for deformation or any other defective conditions.

SERVICE DATA AND SPECIFICATIONS

SPECIFICATIONS

Gear type	Recirculating ball type
Gear ratio	19.8 : 1

SERVICE DATA

Standard thickness of worm bearing adjusting shims	mm (in)	1.5 (0.059)
Initial turning torque of steering column:		
New worm bearing	kg-cm (in-lb)	4.0 to 6.0 (3.5 to 5.2)
Used worm bearing	kg-cm (in-lb)	2.4 to 4.4 (2.1 to 3.8)
End clearance of sector shaft adjusting screw	mm (in)	0.01 to 0.03 (0.0004 to 0.0012)
Backlash at the gear arm top end	mm (in)	0 to 0.1 (0 to 0.004)
Oil capacity	ℓ (U.S.qt., Imper.qt.)	0.33 (⅜, ¼)
Ball joint axial end play	mm (in)	0.1 to 0.5 (0.004 to 0.020)
Standard cross rod length	mm (in)	516 (20.31)
Toe-in	mm (in)	2 to 3 (0.079 to 0.118)
Steering angle:		
Inner wheel		35°30′ to 36°30′
Outer wheel		30°30′ to 31°30′

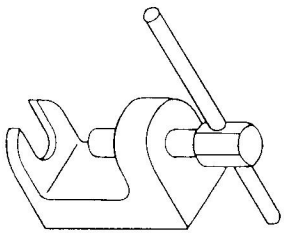
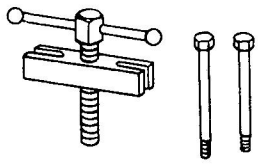
Tightening torque

	Unit: kg-m	(ft-lb)
Steering column jacket to gear housing	1.6 to 1.8	(12 to 13)
Sector shaft cover	1.6 to 1.8	(12 to 13)
Sector shaft lock nut	3.2 to 3.7	(23 to 27)
Gear housing	4.6 to 5.3	(33 to 38)
Gear arm	14	(101)
Steering wheel	7 to 7.5	(51 to 54)
Ball studs of cross rod	5.5 to 7.6	(40 to 55)
Ball studs of side rod:		
Knuckle arm side	5.5 to 7.6	(40 to 55)
Gear or idler arm side	5.5 to 7.6	(40 to 55)

TROUBLE DIAGNOSES AND CORRECTIONS

Condition	Probable cause	Corrective action
Steering wheel moves heavily.	Wheel alignment out of specifications or air pressure in tires too low.	Align or inflate tires to correct pressure.
	Steering linkage out of adjustment.	Adjust and see relative topic under Front Suspension.
	Steering column out of alignment.	Repair.
Steering wheel turns but sluggishly.	Wheels out of alignment or air pressure in tires too low.	Repair or inflate tires to correct air pressure.
	Defrctive steering linkage.	Replace and see relative topic under Front Suspension.
Car pulls to one side.	Wheels out of proper alignment.	Align.
	Wheel bearing out of adjustment.	Adjust.
	Defective steering linkage.	Replace and see relative topic under Front Suspension.

SPECIAL SERVICE TOOLS

No.	Tool number & tool name	Description (Unit: mm (in))		For use on	Reference page or figure No.
1.	ST27140000 Steering gear arm puller	 SE117	This tool is used to remove steering gear arm from steering sector shaft. Caution: Do not hammer on steering gear arm.	620 521 610 510 B110 B120 GC10 C10	Page ST-3 Fig. ST-6 Page ST-6
2.	ST27180000 Steering wheel puller	 SE116	This tool is used to drive out steering wheel. Caution: Do not hammer on steering wheel.	620 610 510 B110 230 780	Fig. ST-4
3.	ST27850000 Steering ball joint puller	 SE089	This tool is used to facilitate the disengagement of ball-joint section. Caution: Do not hammer on ball stud.	620 610 510 B110 B120 E10 S30 C30 230 130 GC10 C10	